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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/631,095	07/31/2003	Oliver Charles Schuepbach	TI-33782	3490
23494	7590	10/31/2006	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED			BENGHUZZI, MOHSIN M	
P O BOX 655474, M/S 3999			ART UNIT	
DALLAS, TX 75265			PAPER NUMBER	
			2611	

DATE MAILED: 10/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/631,095

Applicant(s)

SCHUEPBACH, OLIVER
CHARLES

Examiner

Mohsin (Ben) Benghuzzi

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date July 31, 2003 / November 24, 2003
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to because of the following:

1) Failing to comply with 37 CFR 1.84(p)(5) because they do not include the reference sign '52' mentioned in the description (See Paragraph 52 Line 3 and Figure 8).

2) Failing to comply with 37 CFR 1.84(p)(4) because reference character '60' has been used in the description to designate both the DSP and the memory subsystem of Figure 8 (See paragraph 52 Lines 2 and 7).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 4 and 9 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim that refers to more than one other claim must refer to such claims in the alternative only. Applicant's Claim 4 improperly refers to both claims 2 and 3, and Claim 9 improperly refers to both claims 7 and 8. See MPEP § 608.01(n). Accordingly, claims 4 and 9 are not been further treated on the merits.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1 and 6 are rejected under 35 U.S.C. 101 because they do not appear to be directed to a practical application of the idea. The term 'determining a best scenario' in said claims does not produce useful, concrete, and tangible results. Examiner suggests that term be changed to a one with specific and tangible results such as 'delivering a signal.'

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section

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351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Aymar et al. (US Pub 2002/0056068).

1) Regarding claim 1:

Aymar et al. discloses circuitry for generating a sequence of probable symbols from a sequence of received symbols using Reduced State Sequence Estimation (Paragraphs 116-30 and Paragraph 196 Lines 1-8, wherein, it is clearly understood that RSSE is one form of MLSE), comprising:

butterfly circuitry for computing terms in butterfly structure of (Paragraph 3 Lines 1-6, Paragraph 178 Lines 1-3, and Figure 3B, wherein, $S_{\mu-1,i}$, $S_{\mu-1,i+1}$, $S_{\mu,j}$, $S_{\mu,j+N/2}$, $-d$, and $+d$ respectively correspond to sm_1 , sm_2 , sm_1' , sm_2' , $-m$, and m in Figure 3) $sm_1' = \min\{sm_1 + m, sm_2 - m\}$ and $sm_2' = \min\{sm_1 - m, sm_2 + m\}$; and

circuitry for computing multiple path metrics between a first state and a second state responsive to the received symbols and reference constellation symbols and determining a best scenario at the second state using said butterfly circuitry (Paragraphs 117-130, Paragraphs 142-156, Paragraph 113 Lines 1-4, Paragraph 116 Lines 1-6, and Paragraph 176 Lines 1-12).

2) Regarding claim 6:

Aymar et al. teaches a method of generating a sequence of probable symbols from a sequence of received symbols using Reduced State Sequence Estimation (Paragraphs 116-30 and Paragraph 196 Lines 1-8, wherein, it is clearly understood that RSSE is one form of MLSE), comprising the steps of:

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computing multiple path metrics between a first state and a second state responsive to said sequence of received symbols using a butterfly structure of (Paragraphs 117-130, Paragraphs 142-156, Paragraph 113 Lines 1-4, Paragraph 116 Lines 1-6, Paragraph 176 Lines 1-12, and Figure 3B, wherein, $S_{\mu-1,i}$, $S_{\mu-1,i+1}$, $S_{\mu,j}$, $S_{\mu,j+N/2}$, $-d$, and $+d$ respectively correspond to sm_1 , sm_2 , sm_1' , sm_2' , $-m$, and m in Figure 3) $sm_1' = \min\{sm_1 + m, sm_2 - m\}$ and $sm_2' = \min\{sm_1 - m, sm_2 + m\}$; and

determining a best scenario at the second state using said butterfly structure (Paragraphs 117-130, Paragraphs 142-156, Paragraph 113 Lines 1-4, Paragraph 116 Lines 1-6, and Paragraph 176 Lines 1-12).

7. Claims 1, 5, 6, and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Lindbom et al. (US 6,970,520).

1) Regarding claim 1:

Lindbom et al. discloses circuitry for generating a sequence of probable symbols from a sequence of received symbols using Reduced State Sequence Estimation (Column 4 Lines 1-10 and Column 5 Lines 12-29, wherein, it is clearly understood that RSSE is one form of MLSE), comprising:

butterfly circuitry for computing terms in butterfly structure (Figures 1, 4(a), 4(b), Column 3 Lines 29-36, Column 4 Lines 1-10, and Column 5 Lines 12-29 and Lines 50-64) of

$sm_1' = \min\{sm_1 + m, sm_2 - m\}$ and $sm_2' = \min\{sm_1 - m, sm_2 + m\}$; and

circuitry for computing multiple path metrics between a first state and a second state responsive to the received symbols and reference constellation symbols and determining a best scenario at the second state using said butterfly circuitry (Abstract Lines 1-5, Column 1 Lines 65-66 and Column 5 Lines 12-29).

2) Regarding claim 5:

Lindbom et al. discloses the circuitry of claim 1 and wherein said reference constellation is an 8-PSK constellation, circuitry for expressing axis symbols of the constellation as a function of diagonal symbols in order to assure symmetrical properties for use of the butterfly circuitry (Column 3 Lines 8-14).

3) Regarding claim 6:

Lindbom et al. teaches a method of generating a sequence of probable symbols from a sequence of received symbols using Reduced State Sequence Estimation (Column 4 Lines 1-10 and Column 5 Lines 12-29, wherein, it is clearly understood that RSSE is one form of MLSE), comprising the steps of:

computing multiple path metrics between a first state and a second state responsive to said sequence of received symbols using a butterfly structure (Figures 1, 4(a), 4(b), Column 3 Lines 29-36, Column 4 Lines 1-10, and Column 5 Lines 12-29 and Lines 50-64) of

$sm_1 = \min\{sm_1 + m, sm_2 - m\}$ and $sm_2 = \min\{sm_1 - m, sm_2 + m\}$; and

determining a best scenario at the second state using said butterfly structure (Figures 1, 4(a), 4(b), Column 3 Lines 29-36, Column 4 Lines 1-10, and Column 5 Lines 12-29 and Lines 50-64).

4) Regarding claim 10:

Lindbom et al. teaches the method of claim 6 wherein the reference constellation is an 8-PSK constellation, and further comprising the step of expressing axis symbols of the constellation as a function of diagonal symbols in order to assure symmetrical properties for use of the butterfly circuitry (Column 3 Lines 8-14).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2-4 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aymar et al. (US Pub 2002/0056068) in view of Lindbom et al. (US 6,970,520).

1) Regarding claim 2:

Aymar et al. discloses the circuitry of claim 1 but does not disclose further comprising circuitry for rotating said received symbols by a predetermined angle. However, Lindbom et al. discloses further comprising circuitry for rotating said received symbols by a predetermined angle. (Column 2 Lines 61-64 and Column 8 Lines 58-62, wherein, phase shifting is interpreted as rotating by a predetermined angle).

It is desirable that received symbol constellation be rotated by a predetermined angle. Angle rotation results in calculations that are more computationally efficient (See Lindbom et al., Column 2 Lines 59-60). Therefore, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to include angle rotation circuitry, as Lindbom et al. teaches, into the circuitry of Aymar et al., in order to result in a system with more computational efficiency.

2) Regarding claim 3:

Aymar et al. discloses the circuitry of claim 1 but does not disclose further comprising circuitry for rotating said reference constellation symbols by a predetermined angle. However, Lindbom et al. discloses further comprising circuitry for rotating said reference constellation symbols by a predetermined angle (Column 2 Lines 61-64 and Column 8 Lines 58-62, wherein, phase shifting is interpreted as rotating by a predetermined angle).

As discussed in claim 2 above, it is desirable that reference constellation symbols be rotated by a predetermined angle. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include angle rotation circuitry, as Lindbom et al. teaches, into the circuitry of Aymar et al., in order to result in a system with more computational efficiency.

3) Regarding claim 4: (claim is interpreted to depend from claim 2)

Furthermore, Aymar et al. does not disclose wherein said predetermined angle is $(2k+1)*\pi/8$ with k being a whole number. However, there exist eight distinct phase angles for an 8-PSK symbol constellation, i.e., there exist eight equally separated angles within one 2π angular rotation. It is well known in the art that in order to obtain such angle distribution over a 2π rotation, each angle must be of the value $(2k+1)*\pi/8$ with k being a whole number. Therefore, it would have been obvious to one of ordinary

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skill in the art at the time the invention was made to set the predetermined angle in the circuitry of Aymar et al. to $(2k+1)*\pi/8$ with k being a whole number.

4) Regarding claim 7:

Aymar et al. teaches the method of claim 6 but does not teach further comprising the step of rotating said received symbols by a predetermined angle.

However, Lindbom et al. teaches further comprising the step of rotating said received symbols by a predetermined angle (Column 2 Lines 61-64 and Column 8 Lines 58-62, wherein, phase shifting in interpreted as rotating by a predetermined angle).

It is desirable that received symbol constellation be rotated by a predetermined angle. Angle rotation results in calculations that are more computationally efficient (See Lindbom et al., Column 2 Lines 59-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include angle rotation circuitry, as Lindbom et al. teaches, into the method of Aymar et al., in order to result in a system with more computational efficiency.

5) Regarding claim 8:

Aymar et al. teaches the method of claim 6 but does not teach further comprising the step of rotating said reference constellation symbols by a predetermined angle. However, Lindbom et al. teaches further comprising the step of rotating said reference constellation symbols by a predetermined angle (Column 2 Lines 61-64 and Column 8 Lines 58-62, wherein, phase shifting in interpreted as rotating by a predetermined angle).

As discussed in claim 7 above, it is desirable that reference constellation symbols be rotated by a predetermined angle. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include angle rotation circuitry, as Lindbom et al. teaches, into the method of Aymar et al., in order to result in a system with more computational efficiency.

6) Regarding claim 9: (claim is interpreted to depend from claim 7)

Furthermore, Aymar et al. does not teach wherein said predetermined angle is $(2k+1)*\pi/8$ with k being a whole number. As discussed in claim 4, it is well known in the art that in order to obtain angle distribution in which there exists eight equally separated angles over a 2π angular rotation, each angle must be of the value $(2k+1)*\pi/8$ with k being a whole number. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to set the predetermined angle in the method of Aymar et al. to $(2k+1)*\pi/8$ with k being a whole number.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Zangi et al. (US 6,707,849) teaches a method, receiver, and equalizer having increased computational efficiency.


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohsin (Ben) Benghuzzi whose telephone number is

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(571) 270-1075. The examiner can normally be reached Monday through Friday, 8:30am- 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

12. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER

Mohsin (Ben) Benghuzzi

October 26, 2006